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# PATENT SPECIFICATION



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221,598

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## COMPLETE SPECIFICATION.

### Improvements in Drying or Removing the Liquid from Solutions or Suspensions of Substances in Liquids.

I, GUSTAVE ZIA NAFILYAN, a citizen of the French Republic, of 68, Avenue de Rumine, Lausanne, Switzerland, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to apparatus for drying or removing the liquid from solutions or suspensions of substances in liquids and more particularly to apparatus of the type in which the liquid is atomised to form a fine mist which is projected horizontally into a drying chamber through which a stream of drying air flows vertically.

The object of the invention is to provide improved apparatus of this type whereby the extraction of solid or liquid substances held in solution or suspension or emulsified in liquids such as milk, blood, eggs, extract of meat and of fish, fruit juice, saline solutions or other materials may be effected at temperatures which will not affect these substances prejudicially.

The invention consists in apparatus of the type referred to comprising a drying chamber in which the liquid is atomised by compressed air or gas and projected horizontally across a stream of drying air which passes downwardly through the drying chamber to an outlet near the bottom thereof, in combination with a settling chamber of a known type heretofore used in connection with spray-drying apparatus, in which the greater part of the material settles by gravity and from which the drying air escapes through filters.

The preferred form of the apparatus according to the invention is shown diagrammatically in the accompanying drawing.

As shown in the drawing, the apparatus comprises a drying chamber *a* in which is disposed an atomiser *d* supplied with compressed air through the pipe *f*. At or near its lower end, the drying chamber *a* communicates with a settling chamber *g* containing a number of filter screens *h* through which the drying air is drawn by a fan *i*. A conveyor *k* moving over the bottom of the drying and settling chamber delivers the dried material.

In operation, the liquid to be treated is fed to the atomiser *d* through the pipe *e* and the pipe *f* is supplied with compressed air. The liquid is atomised by the compressed air and is projected horizontally in the form of a fine mist across which a stream of drying air is drawn by means of the fan *i*. The air enters at the upper end of the drying chamber *b* and flows downwardly, carrying the dried material with it into the settling chamber *g* where most of the dried material is precipitated onto the conveyor *k*. Any solid particles still remaining in suspension are recovered at the filter screens *h*.

By means of this apparatus an impalpable powder may be obtained not containing more than 3 to 7 per cent. of moisture without having had recourse to heating and thereby modified the properties of the primary product or raw material. In the practical utilisation of the powder it is sufficient to add to it the quantity of water which had been taken away, in order to effect the integral reconstitution of the raw material, as regards all its elements, whatever the liquid medium may be from which the powder has been extracted *viz.*: a solution, suspension, emulsion or in colloidal form.

We may also by the same process separate the solid substances contained in other media or solvents, on condition

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that these solvents are capable of evaporation in air, such for example as ethers, light hydrocarbons, essential oils, benzene, alcohols *etc.*

- 5 If found necessary or desirable, the drying air may be dried and/or heated before being admitted to the chamber *a*.

This may be effected in any suitable known manner.

- 10 Where the liquid carried away by the air is a volatilised or gasified solvent other than water such as ether, benzene, light hydrocarbon, alcohol or the like, from which dissolved or suspended substances  
15 have been removed, this may be recovered by passing the air drawn out from the chamber *y* through condensers placed at the outlet of the filters *h*.

- 20 Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Apparatus for drying or removing

the liquid from solutions or suspensions 25 of solids in liquids wherein the liquid is atomised by compressed air or gas and projected horizontally in the form of a fine mist in a drying chamber through which a stream of drying air passes 30 downwardly to an outlet at or near the bottom of the drying chamber and into a settling chamber, in which the greater part of the dried material is collected, and from which the drying air escapes 35 through filters.

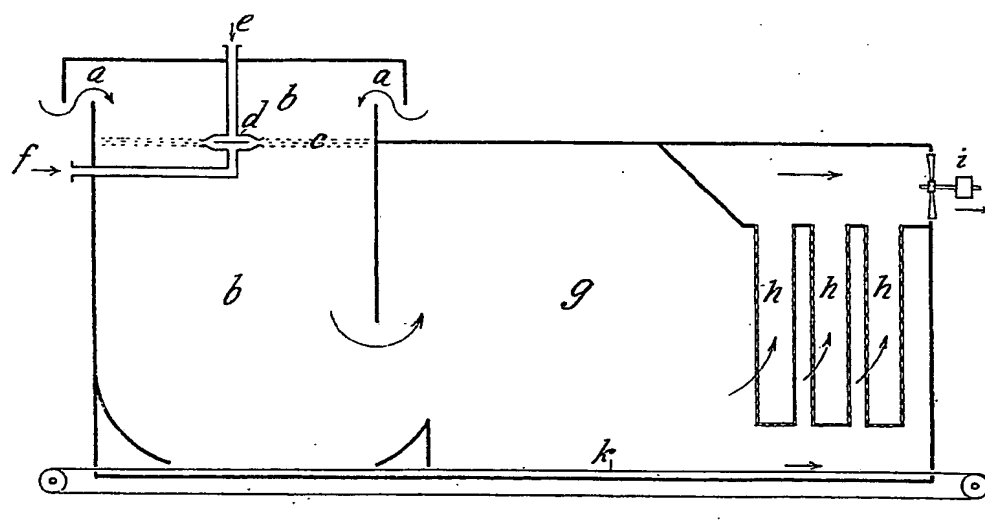
2. The apparatus for drying or removing the liquid from solutions or suspensions of solids in liquids constructed and adapted to operate as a whole substantially as described with reference to the 40 accompanying drawings.

Dated this 1st day of June, 1923.

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[This Drawing is a reproduction of the Original on a reduced scale]



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